REMARKS

Claims 1-16 remain in this application. Claims 13-16 are allowed. Claim 6 is objected to. Claims 1, 2, and 4-12 are amended herein to clarify the invention. Other formal matters are attended to that were not addressed by the Examiner and accordingly are considered unrelated to substantive patentability issues.

CLAIM OBJECTIONS

Claims 10-12 are objected to for allegedly not being in proper multiple dependent form for not referring to intervening claims in the alternative. It is respectfully submitted that the rejection is improper because multiple dependent claim 10, contrary to the assertion in the Office Action, refers to claims 8 and 9 in the alternative using the acceptable phrase "claim 8 *or* claim 9." (emphasis added) (*See* MPEP §608.01(n) I.A. Claim 3). Accordingly, withdrawal of the objection is respectfully requested

Claim 6 is indicated as allowed and is not placed in independent form.

CLAIM REJECTIONS UNDER 35 U.S.C. § 102(b)

Claims 1-5, and 7-9 are rejected under 35 U.S.C. § 102(b) as being anticipated by the Kimura reference. Applicant herein respectfully traverses these rejections. "Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, *arranged as in the claim.*" ***Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.***, 221 USPQ 481, 485 (Fed. Cir. 1984) (emphasis added). It is respectfully submitted that the cited reference is deficient with regard to the following.

Claim 1, 8 and 9 are amended to incorporate subject matter from claim 4 relating to converting the alternating signals from the first and second alternating signal output means into logic signals having the same phase difference as the alternating signals. In other words, the alternating analog signals produced are converted to logic level signals as shown in Figs. 5(1)-5(3). The output signal processing unit then produces the phase difference correspondence signal from the logic level signals. This feature is not disclosed in the Kimura reference.

In the torque sensor of the Kimura reference, the torque t is detected by $t = K\theta = K(\theta_1 - \theta_2)$ (See Column 10, line 44-51). The rotation angles θ_1 and θ_2 are given from voltages e_{Al}, e_{Bl}, e_{A2}, e_{B2} generated by sensor elements (See Column 10, line 29-43). The voltages e_{Al}, e_{B1}, e_{A2}, e_{B2} are alternating signals (See Fig. 21 and Column 10, line 24--29). The voltage signals e_{Al}, e_{B1}, e_{A2}, e_{B2} are fed directly to the microcomputer 113A which incorporates an A/D converter. The voltage signals e_{Al},

e_{B1}, e_{A2}, e_{B2} are not converted to logic signals which maintain the phase relationship of the voltage signals e_{Al}, e_{B1}, e_{A2}, e_{B2}. Therefore, in Kimura reference, the microcomputer must sample a huge number of data by A/D converting the alternating signals e_{Al}, e_{B1}, e_{A2}, e_{B2} to precisely determine the torque. The microcomputer 113A must analyze the output of the internal A/D, which is a stream of digital words representative of levels and is not a signal corresponding to a phase difference.

Alternatively, Fig. 15 illustrates the circuit 11 used to produce Vt which is fed to the microcomputer 113A and Fig. 16 shows the waveforms fed to the circuit 11. Clearly the inputs Vx and Vy are *not* logic signals. In other words, there is no signal produced from logic signals which is representative of torque. Again, the output Vt is fed to the microcomputer 113A.

In stark contrast, in the present invention defined by claims 1, 8 and 9, the torque valve is found directly from the phase difference correspondence signal. The phase difference correspondence signal is output by processing the first and second logic signals. The phase difference between the first and second logic signals is equal to that of the first and second alternating signals of which phases change according to differential changes in the rotation angles of the first and second shafts. Therefore, according to the present invention, the torque value can be determined without A/D converting numerous alternating signals. In other words, there is no need to sample a huge number of data, so that the load for signal processing to precisely determine the torque value can be reduced.

With regard to claim 4, the Office Action refers to "logic conversion circuit 113B" as converting an alternating signal to a logic signal. However, as shown in Fig. 18, the logic circuit receives it's input from the microcomputer 113A which is clearly a digital input and does not contain two alternating signals representative of a phase difference. The logic circuit 113B is further used to drive the power transistors controlling the motor 105 as is further detailed in Fig. 21. In Fig. 21, the embodiment of the logic circuit receives input to a D/A converter 144, which is a digital word, and rotational direction signal l and r. None of these signals can be said to be alternating signals having a phase difference corresponding to the shafts nor can the output feeding power transistors 114A-114D be said to maintain the phase difference.

With regard to claim 5, the Office Action alleges that the above noted logic circuit 113B, as detailed in Fig. 20, corresponds to the claimed edge detecting arrangement of claim 5. This is clearly incorrect in view of the above analysis which reveals the circuit does not receive the claims first and second alternating signals or first and second logic signals. The PWM merely receives the output of the A/D which is driven by a digital word from the microprocessor which has nothing to do with edge detection.

Furthermore, according to the present invention defined by claims 8 and 9, not only the detected torque value found from the phase difference correspondence

signal but also the reference torque value obtained by A/D converting the signals from the detectors is determined, and a fault signal is output when the absolute value of the deviation between the detected torque value and reference torque value exceed a predetermined limit. On the contrary, Kimura reference is silent about the output of such fault signal. Indeed, the Office Action fails to even address a fault signal and does not identify where the supposed reference torque signal and detect torque signals are disclosed.

In view of the above, it is respectfully submitted that claims 1-5, and 7-9 particularly describe and distinctly claim elements not disclosed in the cited reference. Therefore, reconsideration of the rejections of claims 1-5, and 7-9 and their allowance are respectfully requested.

In accordance with MPEP 706.02(j), when a claim is rejected the Examiner should set forth "the relevant teachings of the prior art relied upon, preferable with reference to the relevant column or page number(s) and line number(s)." In order for the applicant to respond appropriately, it is respectfully requested that, in the event the pending claims are again rejected based on the cited reference, the Examiner set forth the relevant teachings in the cited references with reference to relevant column and line numbers or reference designators.

In light of the foregoing, the application is now believed to be in proper form for allowance of all claims and notice to that effect is earnestly solicited. Please charge any deficiency or credit any overpayment to Deposit Account No. 10-1250.

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